SURVEY PAPER ON - ATTENDANCE SYSTEM USING GEOFENCING WITH TIMMING AND FACE RECOGNITION

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❖ □ABSTRACT
Creating an efficient attendance tracking system has perpetually posed a challenge for various organizations, including educational institutions like schools and universities. The implementation of smartphone-based technologies, such as face recognition and fingerprint-based attendance, has been a notable approach. The focus of this study revolves around the attendance management system (AMS) and its associated challenges. Specifically, the study introduces a student attendance system designed for educational institutions, which integrates Geo Fencing, using Google Play services' geofencing API, Google location services dependencies, and incorporates Firebase and Geofire dependencies along with Face Recognition functionality. The system operates by capturing real-time student locations within a set geographical boundary, employing face recognition for pre-registered students, and automatically recording attendance when a student remains within the designated geo-fence (classroom) for over 90% of the allocated time. This system was developed using the Android Studio Integrated Development Environment (IDE), primarily utilized for creating native Android applications. The data collected underwent statistical analysis using SPSS, revealing that the attendance system significantly enhanced the precision, authentication, and accuracy of student attendance. Keywords: Geo-fencing, face recognition, Firebase, Geofire.

❖ □I - INTRODUCTION
The regularity of students' presence in schools and colleges holds significant weight in shaping their academic success. Consistent attendance is linked to lower tendencies of engaging in disruptive or negative behaviors. Chronic absenteeism significantly heightens the likelihood of academic underachievement and premature departure from educational institutions. Attendance essentially signifies the act of being present, particularly within an educational setting. It serves as a key indicator of a student's punctuality. Manual tracking of attendance is notably ineffective due to possibilities of proxy attendance or impersonation. The correlation between class attendance and academic performance is substantial. Consequently, many educational institutions mandate a minimum attendance threshold for students to qualify for examinations. This requirement stems from the belief that higher-than-average attendance directly contributes to improved academic achievements among students.

Before the era of computers and mobile devices, the prevalent method of recording attendance in our educational institutions involved the manual use of pen and paper. This traditional attendance system typically entailed verbally calling out the names of students in a class or passing an attendance sheet around for each student to physically sign, confirming their presence. However, this common method of recording attendance is prone to inaccuracies, including incorrect records, data tampering, and the potential for attendance fraud.

To address these issues, various mobile-based attendance management systems have emerged in recent years. These solutions primarily fall into two categories: RFID/NFC-based and visual-based methods, aiming to offer more accurate and reliable attendance tracking compared to the traditional manual approach.

Student attendance tracking via smartphones has incorporated various technologies such as face recognition, fingerprint-based systems, and Bluetooth-based methods. However, using smartphones for attendance purposes is susceptible to fraudulent activities by students, including instances where

attendance records may not reflect the actual location, unauthorized recording of attendance, or students leaving the premises after marking their presence.

To address these issues, a combination of security measures involving fingerprint authentication, secure user identification, and GPS location verification can enhance the accuracy and security of attendance recording. Furthermore, implementing safeguards within the attendance application to counteract emulators and fake location modules would significantly bolster the security of the Mobile Attendance System.

To overcome the limitations seen in various mobile attendance systems that struggle to effectively tackle issues like interim and proxy attendance through sole reliance on smartphone applications, this study centers on the utilization of geofencing technology. Geofencing, a location-based tool, monitors the movement in and out of defined areas via virtual boundaries. The proposed system aims to resolve problems related to interim and alternative attendance by automating the recording of student access upon entering or leaving a classroom established as a geofenced zone using a smartphone. Geofencing serves as an advanced time management solution with the ability to track student attendance in real-time. It allows organizations to monitor staff attendance and assists educational institutions in managing student attendance remotely from any location..

Attendance System

Incorporating Geofencing in the system is intended to create a location boundary where students can mark their presence and utilize face recognition for validation to minimize fraudulent absenteeism. Within this proposed system, every student is mandated to possess a student ID, a login password, and register a facial image before being granted access to attendance through an existing mobile application

❖ □II - OBJECTIVE

➢ The objective of implementing an attendance system that integrates geofencing timing and face recognition is to precisely monitor and log attendance by employing location-based timing alongside facial recognition technology.

➢ Automating the attendance process ensures that only authorized individuals have the capability to mark their attendance.

➢ For universal accessibility, interpretability is essential for ensuring that all individuals can effectively use this system.

➢ We have the capability to prevent fraudulent attendance entries by users.

Precision: Ensure precise and reliable tracking of employee attendance, minimizing inaccuracies and the potential for fraudulent activities.

Streamlined Process: Simplify the attendance recording process, enhancing efficiency for both employees and administrative personnel.

Real-Time Surveillance: Enable immediate, ongoing monitoring of attendance, granting instant access to attendance information.

Cost Savings: Lower expenses associated with traditional attendance tracking methods, such as manual entry or paper-based systems.

Transparency and Reliability: Offer a transparent and dependable system for both employees and management to effortlessly access their attendance records.

Automated Reporting: Automate the creation of attendance reports, facilitating easier analysis of attendance data for managers and HR personnel.

Support for Remote Work: Enable the effective tracking of attendance for employees working remotely or at off-site locations.

Technological Integration: Utilize modern technologies such as GPS, biometrics, mobile applications, or cloudbased solutions to ensure precise and convenient attendance tracking.

Compliance and Regulatory Adherence: Ensure adherence to labor laws and regulations governing attendance records and overtime for employees.

Enhanced Decision-Making: Facilitate better decisionmaking based on accurate and current attendance data for optimal resource allocation and workforce management.

Boosting Employee Productivity: Monitor and comprehend employee attendance patterns to enhance productivity and address issues related to absenteeism or tardiness.

Enhanced Security: Implement robust and reliable methods to prevent manipulation or unauthorized access to attendance data, ensuring its security.

❑ □Proposed System Architecture Model
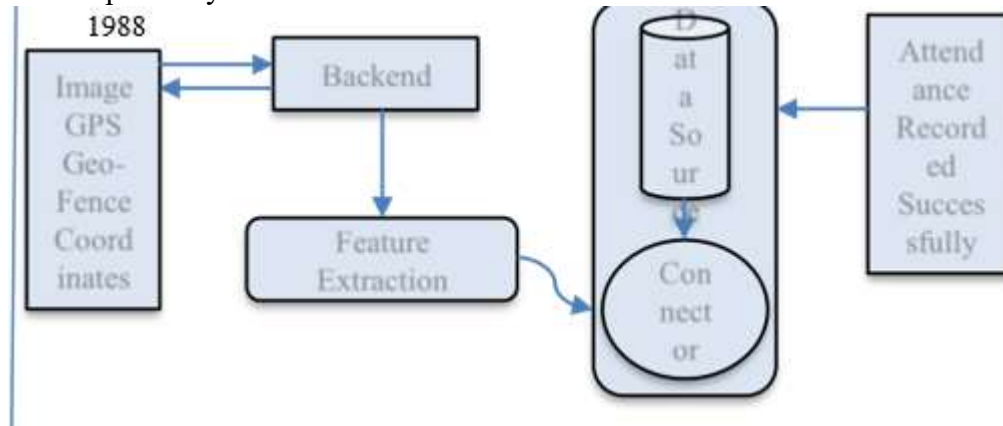
❖ □III - LITERATURE SURVEY

1. Face Recognition Attendance System Based on Real-Time Video Processing(2020) This article introduces a face recognition attendance system based on real-time video processing, which is implemented and tested in two colleges within a province to monitor and manage student attendance. The study primarily focuses on four key aspects: the accuracy of the face recognition system during live attendance checks, the system's

. stability when processing real-time video, the detection of instances where the system fails to register attendance accurately, and challenges related to setting up the interface for the face recognition attendance system using real-time video processing. Through analyzing these issues, the article proposes the concept of an attendance system reliant on face recognition technology and conducts research on the application of face recognition in attendance systems using real-time video processing. Research findings indicate that the accuracy of the video-based face recognition system stands at approximately 82%.

2. Student Attendance System using Face Recognition (2019): This method outlines a comprehensive face recognition-based automated student attendance system. The approach offers a technique to identify individuals by comparing their input image, captured from recorded video frames, with the registered images obtained during the semester registration process. The proposed approach has the capability to detect and pinpoint faces from the input facial images stored in the database, sourced from the recorded video frames.

3. The Location Based Attendance System(2023): The Mobile Attendance System (MAS) is built around an Android-operating mobile phone with GPS technology, a computer, and a Wi-Fi access point. The system serves a straightforward purpose: it enables staff members to clock in and out using their smartphones by simply pressing a button. The system leverages the smartphone's built-in GPS receiver to accurately locate employees, recording their attendance in real-time. Details like the smartphone's IMEI number and GPS data are then uploaded to a centralized directory, potentially replacing existing reporting methods. The system has been effectively tested, demonstrating its functionality both within and outside the office premises. This solution streamlines and simplifies the staff attendance process, particularly when employees are working remotely or on-site.

4.   Automated Attendance Tracker 2021

The primary objective behind creating the automated attendance system was to reduce errors commonly found in conventional attendance tracking methods. Its purpose is to automate and establish a system that would particularly benefit organizations such as educational institutes or office environments, offering a more efficient and accurate alternative to the traditional manual processes. This technology is both secure and reliable, readily accessible without the need for specialized hardware; it can be set up using a camera and a computer. The system integrates an attendance tracking feature for lectures or laboratories, enabling instructors or teaching assistants to monitor student attendance, ultimately saving time and effort. OpenCV is the technology used to implement this entire system. The system demonstrates the utilization of facial recognition techniques for tracking student attendance, as indicated in the detection and recognition phase showcased in the results. This approach is capable of recognizing multiple faces and can be easily implemented in a classroom environment. The identified faces are then cross-verified against a face database.

❖ □IV. COMPARATIVE STUDY

Sr /No	Paper Name	Author Name	Methodology
1	Face Recognition Attendance System Based on Real-Time Video Processing	Hao Yangi And Xiaofeng Han 2	Algorithm combines Gabor features with Fisher-based discriminant analysis for improved recognition. Convolutional neural network Recursive neural network
2	Student Attendance System using Face Recognition	Anagha Vishe1 ,Akash Shirsath2 , Sayali Gujar3, Neha Thakur4	Haar Cascades a machine learning based approach where a cascade function is trained from a lot of positive and negative images. OpenCV
3	The Location Based Attendance System(2023)	Shreyash Sanjay Galgale*1, Jabibullah Sayyad Yamakanamardi*2, Samiksha Ramesh Koli*3, Mohammadayan Jahangir Desai*4	Global positioning system (GPS) Radio frequency identification (RFID)
4	Automated Attendance Tracker	Rohan Vasista1 , Sachin Rajora2 , Suman Rathod3 , C. Sahana4* ,Reena Lobo5	OpenCV Multi cascade convolution neural network (MTCNN) LBPH (Local Binary Histogram Patterns) Face detection and recognition:

❖ □V. CONCLUSION

Automated Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system. The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This In the course of developing this system the android based mobile application for students" attendance at a university. In this study we

are developing a mobile application for taking students attendance at Trinity College of Engineering and Research, Pune.

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